

WHAT IS CLAIMED IS:

1. An image reading apparatus for outputting a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data,
5 characterized by comprising:

resolution setting means for setting a resolution in the image read;

read data acquiring means for acquiring the read data in number corresponding to the set resolution;

- 10 output clock generating means for generating an output clock for outputting the image data in the image read;

dummy clock generating means for generating a dummy clock for the output clock when the reference data is to be acquired by reading the reference image; and

- 15 timing setting means for matching a timing of the output clock with a timing of the dummy clock in an interval during which the image is read and read data is output.

2. The apparatus according to claim 1, characterized in that

- 20 said timing setting means comprises output bit count changing means for changing the number of output bits of the image data, and

the number of output bits is changed to match the timing of the output clock with the timing of the dummy clock.

- 25 3. The apparatus according to claim 2, characterized in that said output bit count changing means can change the

number of bits to one in a serial output form and an integral power of two in a parallel output form.

4. The apparatus according to claim 1, characterized in that

5 said timing setting means comprises output clock frequency changing means for changing a frequency of the output clock, and

10 the frequency of the output clock is changed to match the timing of the output clock with the timing of the dummy clock.

5. The apparatus according to claim 1, characterized in that

15 said timing setting means comprises driving frequency changing means for changing a driving frequency for a sensor for reading the image, and

 the driving frequency is changed to match the timing of the output clock with the timing of the dummy clock.

20 6. The apparatus according to claim 1, characterized in that said read data acquiring means does not acquire as the read data a portion in which the timing of the output clock differs from the timing of the dummy clock.

7. An image reading apparatus which is mounted on a printer so as to be interchangeable with a printhead, characterized by comprising:

25 image read means for reading an image of an original placed on said printer;

output means capable of outputting the read image data in a serial output form and a plurality of parallel output forms; and

output form selecting means for selecting the output
5 form.

8. An image reading apparatus which is mounted on a printer so as to be interchangeable with a printhead, characterized by comprising:

image read means for reading an image of an original
10 placed on said printer;

clock generating means for generating an output clock for outputting the read image data; and

clock frequency changing means for changing a frequency of the output clock.

15 9. An image reading apparatus which is mounted on a printer so as to be interchangeable with a printhead, characterized by comprising:

image read means for reading an image of an original placed on said printer; and

20 driving frequency changing means for changing a driving frequency for said image read means.

10. An image reading method of outputting a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data,
25 characterized by comprising:

the step of setting a resolution in the image read;

the step of acquiring the read data in number corresponding to the set resolution;

the step of generating an output clock for outputting the image data in the image read;

5 the step of generating a dummy clock for the output clock when the reference data is to be acquired by reading the reference image; and

the step of matching a timing of the output clock with a timing of the dummy clock in an interval during which the
10 image is read and read data is output.

11. An image reading apparatus characterized by comprising:

image read means for reading an image;

serial output means for outputting the image data read
15 by said image read means in a serial form; and

a plurality of parallel output means for outputting the image data read by said image read means in a plurality of types of parallel forms.

12. The apparatus according to claim 11, characterized in
20 that said image read means is mounted on an image reading apparatus main body so as to be interchangeable with a printhead for printing an image.

13. The apparatus according to claim 11, characterized in that said plurality of parallel output means are configured
25 to output the image data in nth (n is an integer) power of two bits.

14. The apparatus according to claim 11, characterized by further comprising switching means for switching said plurality of parallel output means in accordance with a read resolution of said image read means.

5 15. An image reading apparatus characterized by comprising:

image read means for reading an image;

clock generating means for generating a clock signal for outputting the image data read by said image read means;

10 and

clock changing means for changing a frequency of the clock signal in accordance with the read resolution of said image read means.

15 16. An image reading apparatus for outputting a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data, characterized by comprising:

image read means for reading an image;

20 output clock generating means for generating an output clock signal for outputting the image data read by said image read means; and

dummy clock generating means for generating a dummy clock similar to the output clock signal when the reference image is to be read.

25 17. An image reading apparatus characterized by comprising:

image read means for reading an image; and
driving frequency changing means for changing a
driving frequency for a photoelectric conversion sensor
mounted in said image read means.

- 5 18. An image reading apparatus for outputting a difference
between read data acquired by reading an image and reference
data acquired by reading a reference image as image data,
characterized by comprising:

- image read means for reading an image;
- 10 serial output means for outputting the image data read
by said image read means in a serial form;
- a plurality of parallel output means for outputting
the image data read by said image read means in a plurality
of types of parallel forms;
- 15 switching means for switching said plurality of
parallel output means;
- output clock generating means for generating an output
clock signal for outputting the image data read by said image
read means;
- 20 output clock changing means for changing a frequency
of the output clock signal;
- dummy clock generating means for generating a dummy
clock similar to the output clock signal when the reference
image is to be read; and
- 25 driving frequency changing means for changing a
driving frequency for a photoelectric conversion sensor

mounted in said image read means,

wherein fixed noise is removed from an output signal from said photoelectric conversion sensor by using said serial output means, said parallel output means, said switching means, said output clock generating means, said output clock changing means, said dummy clock generating means, and said driving frequency changing means.

19. An image reading apparatus characterized by comprising:

10 image read means for reading an image;

clock generating means for generating a clock signal for outputting the image data read by said image read means; and

removing means for removing the image data in a portion where a read timing of image data from said image read means differs from a timing of the clock signal for outputting the image data.

20. An image reading apparatus for outputting a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data, characterized by comprising:

20 image read means for reading an image;

output clock generating means for generating an output clock signal for outputting the image data read by said image read means;

25 clock changing means for changing a frequency of the

clock signal in accordance with a read resolution of said image read means; and

dummy clock generating means for generating a dummy clock having the same frequency as that of the output clock
5 signal which is changed by said clock changing means when the reference image is to be read.

21. The apparatus according to claim 20, characterized by further comprising dummy data output means for outputting dummy data equivalent to a data output state for each read
10 resolution of said image read means.

22. An image reading method characterized by comprising:
the image read step of reading an image; and
the step of selecting one of output means in a serial
form and output means in a plurality of types of parallel
15 forms to output the image data read in the image read step.

23. An image reading method characterized by comprising:
the image read step of reading an image;
the clock generating step of generating a clock signal
for outputting the image data read in the image read step;
20 and

the clock changing step of changing a frequency of the clock signal in accordance with a read resolution in the image read step.

24. An image reading method of outputting a difference
25 between read data acquired by reading an image and reference data acquired by reading a reference image as image data,

characterized by comprising:

the image read step of reading an image;

the output clock generating step of generating an output clock signal for outputting the image data read in

5 the image read step; and

the dummy clock generating step of generating a dummy clock similar to the output clock signal when the reference image is to be read.

25. An image reading method characterized by comprising:

10 the image read step of reading an image by using image read means; and

the driving frequency changing step of changing a driving frequency for a photoelectric conversion sensor mounted in the image read means.

15 26. An image reading method of reading an image by using an image reading apparatus which outputs a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data and includes image read means for reading an image, serial output
20 means for outputting the image data read by the image read means in a serial form, a plurality of parallel output means for outputting the image data read by the image read means in a plurality of types of parallel forms, switching means for switching the plurality of parallel output means, output
25 clock generating means for generating an output clock signal for outputting the image data read by the image read means,

output clock changing means for changing a frequency of the
output clock signal, dummy clock generating means for
generating a dummy clock similar to the output clock signal
when the reference image is to be read, and driving frequency
5 changing means for changing a driving frequency for a
photoelectric conversion sensor mounted in the image read
means, characterized by comprising

removing fixed noise from an output signal from the
photoelectric conversion sensor by using the serial output
10 means, the parallel output means, the switching means, the
output clock generating means, the output clock changing
means, the dummy clock generating means, and the driving
frequency changing means.

27. An image reading method characterized by comprising:
15 the image read step of reading an image;
the clock generating step of generating a clock signal
for outputting the image data read in the image read step;
and

the removing step of removing the image data in a
20 portion where a read timing of image data in the image read
step differs from a timing of the clock signal for outputting
the image data.

28. An image reading method of outputting a difference
between read data acquired by reading an image and reference
25 data acquired by reading a reference image as image data,
characterized by comprising:

the image read step of reading an image;

the output clock generating step of generating an output clock signal for outputting the image data read in the image read step;

5 the clock changing step of changing a frequency of the clock signal in accordance with a read resolution of the image read means; and

10 the dummy clock generating step of generating a dummy clock having the same frequency as that of the output clock signal which is changed in the clock changing step when the reference image is to be read.

29. The method according to claim 28, characterized by further comprising the dummy data output step of outputting dummy data equivalent to a data output state for each read
15 resolution in the image read step.

30. A storage medium storing a control program for controlling an image reading apparatus, characterized in that

the control program comprises:

20 a code for the image read step of reading an image; and

 a code for the step of selecting one of output means in a serial form and output means in a plurality of types of parallel forms to output the image data read in the image
25 read step.

31. A storage medium storing a control program for

controlling an image reading apparatus, characterized in that

the control program comprises:

a code for the image read step of reading an image;

5 a code for the clock generating step of generating a clock signal for outputting the image data read in the image read step; and

a code for the clock changing step of changing a frequency of the clock signal in accordance with a read
10 resolution in the image read step.

32. A storage medium storing a control program for controlling an image reading apparatus for outputting a difference between read data acquired by reading an image and reference data acquired by reading a reference image as
15 image data, characterized in that

the control program comprises:

a code for the image read step of reading an image;

a code for the output clock generating step of generating an output clock signal for outputting the image
20 data read in the image read step; and

a code for the dummy clock generating step of generating a dummy clock similar to the output clock signal when the reference image is to be read.

33. A storage medium storing a control program for
25 controlling an image reading method, characterized in that

the control program comprises:

a code for the image read step of reading an image by using image read means; and

a code for the driving frequency changing step of changing a driving frequency for a photoelectric conversion sensor mounted in the image read means.

34. A storage medium storing a control program for controlling an image reading apparatus which outputs a difference between read data acquired by reading an image and reference data acquired by reading a reference image as image data and includes image read means for reading an image, serial output means for outputting the image data read by the image read means in a serial form, a plurality of parallel output means for outputting the image data read by the image read means in a plurality of types of parallel forms, switching means for switching the plurality of parallel output means, output clock generating means for generating an output clock signal for outputting the image data read by the image read means, output clock changing means for changing a frequency of the output clock signal, dummy clock generating means for generating a dummy clock similar to the output clock signal when the reference image is to be read, and driving frequency changing means for changing a driving frequency for a photoelectric conversion sensor mounted in the image read means, characterized in that

the control program comprises
a code for the step of removing fixed noise from an

output signal from the photoelectric conversion sensor by
using the serial output means, the parallel output means,
the switching means, the output clock generating means, the
output clock changing means, the dummy clock generating
5 means, and the driving frequency changing means.

35. A storage medium storing a control program for
controlling an image reading apparatus, characterized in
that

the control program comprises
10 a code for the image read step of reading an image;
a code for the clock generating step of generating a
clock signal for outputting the image data read in the image
read step; and
a code for the removing step of removing the image data
15 in a portion where a read timing of image data in the image
read step differs from a timing of the clock signal for
outputting the image data.

36. A storage medium storing a control program for
controlling an image reading apparatus for outputting a
20 difference between read data acquired by reading an image
and reference data acquired by reading a reference image as
image data, characterized in that

the control program comprises:
a code for the image read step of reading an image;
25 a code for the output clock generating step of
generating an output clock signal for outputting the image

1. *Principles of Mathematics* (1903) by Giuseppe Peano. This work is a foundational text in the foundations of mathematics, introducing the concept of natural numbers and the principle of mathematical induction.

5. a code for the dummy clock generating step of generating a dummy clock having the same frequency as that of the output clock signal which is changed in the clock changing step when the reference image is to be read.

10